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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10 024,996	12 18 2001	Andrew L. Reynolds	920476-907475	3546

7590 06 03 2003  
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EXAMINER

VALENCIA, DANIEL E

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 06/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/024,996

Applicant(s)

REYNOLDS ET AL

Examiner

Daniel E Valencia

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on 06 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 17-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 17-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

Applicant's communication filed on May 6, 2003 has been carefully studied by the Examiner. In accordance with the communication, claims 1-16 have been cancelled and claims 17-37 have been acknowledged.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 17-21, 25, 26, 29-32, and 36-37 are rejected under 35 U.S.C. 102(e) as being Pan by U.S. Patent No. 6,400,869. Refer to the appropriate drawings or parts of the specification. Pan discloses a tunable compensation for polarization-mode dispersion using a birefringent nonlinearly chirped Bragg grating with all the limitations of the abovementioned claims. Regarding claims 17, 18, 25, 26, 29-32, and 36-37, Pan discloses a method of compensating for polarization mode dispersion in an optical fibre transmission system, comprising the steps of: providing an optical transmission fibre (fig 1); incorporating into said optical transmission fibre a length of fibre exhibiting high birefringence (101) relative to the birefringence of said optical transmission fibre, said

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length of high birefringence optical fibre having a grating formed therein (col. 1, lines 59-65); measuring a difference in group velocities (col. 1, lines 30-47) of orthogonal polarization states traveling in the optical transmission fibre; and in response to said measurement of the difference in group velocities, adjusting a parameter of the fibre grating in order to impose a differential time delay on said orthogonal polarization states traveling in the optical transmission fibre to compensate for polarization mode dispersion caused by the birefringence of the optical fibre (col. 6, lines 9-19). Pan further discloses that the grating is a nonlinear Bragg grating, wherein the parameter being adjusted is the pitch (col. 6, lines 25-30), as described in claims 19-21.

Although Pan does not explicitly state the step of incorporating the birefringent fibre into a transmission with a transmitter and end and a receiver end, this limitation would be inherently disclosed by the reference (figure 2A).

Claims 17, 22-24, 32, 33, and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Brennan, III U.S. Patent Application Publication No. 2003/0059195. Refer to the appropriate drawings or parts of the specification. Brennan discloses optical devices using shaped optical fibers and methods with all the limitations of the abovementioned claims. Regarding claims 17, 32, and 35, Brennan discloses an optical fibre for an optical transmission system, comprising: a transmission optical fibre; a length of optical fibre exhibiting high birefringence (paragraph 3) incorporated into said transmission optical fibre, said high birefringence optical fibre including a fibre grating formed therein (paragraph 14); means integrated into the structure of said high

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birefringence optical fibre responsive to heating in order to cause a parameter (paragraph 57) of said fibre grating to alter when said adjustment means is heated (paragraph 60 and 76). Additionally, Brennan discloses that the heating elements are selectively energized and locally distributed (paragraph 76), as described by instant claims 22-24 and 33.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27, 28, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan in view of Koplow U.S. Patent Application Publication No. 2002/0159139. Refer to the appropriate drawings or parts of the specification. Pan as applied above, discloses a device and method for compensating for polarization mode dispersion with a majority of the claimed limitations. However, the reference is silent as to the means of adjusting the grating parameters.

On the other hand, Koplow discloses a polarization-maintaining optical fiber amplifier employing externally applied stress-induced birefringence that teaches the limitation that the Pan reference fails to mention. Specifically, Koplow discloses a method and device for compensating for polarization mode dispersion that uses a high

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birefringence optical microstructured fiber (fig. 1-4) comprising one of the fiber types enumerated in claim 27, wherein the fiber has rods of thermally sensitive material formed within the microstructure of the fiber (paragraph 12), whereby adjustment of a parameter of the fibre grating is effected by subjecting the rods to heat, as explained in claims 28 and 34. Koplow teaches that it is advantageous to use thermally sensitive rods in order to apply stress by utilizing the differences in thermal expansion coefficients (paragraph 12).

The Pan and Koplow references both teach means of controlling the birefringence of an optical fibre, thereby compensating for mode dispersion. Additionally, although the Pan reference does not explicitly state the use of thermally sensitive rods, figure 2A shows two stress inducing areas around the core (not labeled) that change the pitch of the grating. It follows that the teachings of Koplow are combinable with the device disclosed in Pan. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use thermally sensitive rods in the device disclosed by Pan as a means of adjusting the grating parameter.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Eyal U.S. Patent No. 6,546,170 discloses devices and method for reducing dispersion in optical communications that adjusts the birefringence of a fiber with a grating.

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Bond U.S. Patent Application Publication No. 2003/0039442 discloses a grating dispersion compensator wherein the device uses heat energy or electrical energy to adjust the grating.

Feng U.S. Patent No. 6,453,095 discloses a tuning of optical dispersion by using a tunable fiber Bragg grating, wherein the grating is adjusted by using piezoelectric or thermally responsive elements.

Arie U.S. Patent Application Publication No. 2002/0101648 discloses an electro-optical device and a wavelength selection method utilizing the same that is used for dispersion compensation.

Trzeciecki U.S. Patent No. 6,560,014 discloses method and device for controlling the polarization of a beam of light that uses electro-optic material to adjust the birefringence of the waveguide.

*Application Publication*  
Fermann U.S. Patent No. 20020172486 discloses a single polarization power fiber lasers that uses stress rods to adjust the birefringence of the optical fiber.

Gao U.S. Patent Application Publication No. 2003/0068130 discloses a dynamic gain-equalizing filter based on polymer optical waveguide gratings, wherein the temperature is adjusted to change the birefringence of the waveguide.

Chowdhury U.S. Patent No. 6,556,732 discloses an all fiber polarization mode dispersion compensator, wherein the differential time delay of two orthogonal polarization states is adjusted to compensate for dispersion.

Eggleton U.S. Patent No. 6,438,277 discloses a stabilized thermally tunable optical waveguide with gratings.

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Patterson U.S. Patent No. 6,356,684 discloses adjustable optical fiber grating dispersion compensator wherein a transducer is used to adjust the birefringence of an optical fiber.

Epworth U.S. Patent No. 6,515,778 discloses polarization mode dispersion compensation, wherein the birefringence of an optical fiber with a grating is adjusted by applying stress and changing the pitch of the grating.

Robinson U.S. Patent Application No. 2002/0191912 discloses a compensation apparatus and method utilizing sampled Bragg gratings, wherein a thermally sensitive material is distributed in certain locales through the fiber.

Ovadia U.S. Patent Application Publication No. 2003/0077037 discloses a method and apparatus of semiconductor based tunable optical dispersion compensation system, wherein the birefringence of a waveguide is adjusted to impose a differential time delay.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. The following claim language did not appear anywhere in the original set of claims and required a new search and new consideration:

1. "adjusting of the pitch of said fiber grating" – claim 19
2. "fibre Bragg grating" – claim 21
3. Claim 22 in its entirety
4. Claim 23 in its entirety
5. Claim 25 in its entirety



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6. Claim 26 in its entirety
7. Claim 30 in its entirety
8. Claim 31 in its entirety
9. Claim 33 in its entirety

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection, necessitated by Applicant.

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel E Valencia whose telephone number is (703)-305-4399. The examiner can normally be reached on Monday-Friday 9:30-6:00.

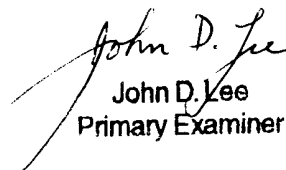
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The fax phone numbers for the organization where this application or proceeding is assigned are (703)-308-7724 for regular communications and (703)-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-0956.

A handwritten signature in black ink, appearing to be 'D. Lee'.

dv  
May 27, 2003

A handwritten signature in black ink, appearing to be 'John D. Lee'.  
**John D. Lee**  
**Primary Examiner**